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ABSTRACT

Farley's theory of arousal and stimulation-seeking proposes specific educational alternatives for high and low arousal and hyperkinetic children. This study tested the prediction that open classrooms provide children at the lower end of the physiological arousal continuum with enough external stimulation to reduce their overt seeking of stimulation. The reduced level of external stimulation in traditional classrooms was predicted to be more suitable for high arousal children. Subjects were 98 children in three open and three traditional classrooms. They were observed and tested on both physiological and performance measures at the beginning and end of their first year of school. Results indicated that observers and teachers identified behavior problems more readily in traditional classrooms, with clearly differentiated norms, than in open classrooms, in which a wider range of behavior is tolerated. On a measure of concentration, children in the open classrooms took longer to complete the task and made fewer errors at both times of testing. Data analyzed for subgroups of children representing extremes of the arousal level continuum revealed an interesting pattern: high arousal children showed performance decrements over time in the open classroom environment, as predicted by Farley's theory. (Author)

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Arousal and Hyperactivity in Open and Traditional Education

by

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Abstract

Farley's theory of arousal and stimulation-seeking proposes specific educational alternatives for high and low arousal and hyperkinetic children. This study tested the prediction that open classrooms provide children at the lower end of the physiological arousal continuum with enough external stimulation to reduce their overt seeking of stimulation. The reduced level of external stimulation in traditional classrooms was predicted to be more suitable for high arousal children. Ninety-eight children in three open and three traditional classrooms were observed and tested on both physiological and performance measures at the beginning and end of their first year of school.

Results indicated that observers and teachers identified behavior problems more readily in traditional classrooms, with clearly differentiated norms, than in open classrooms in which a wider range of behavior is tolerated. On a measure of concentration, children in the open classrooms took longer to complete the task and made fewer errors at both times of testing. Data analyzed for subgroups of children representing extremes of the arousal level continuum revealed an interesting pattern; that is, high arousal children showed performance decrements over time in the open classroom environment, as predicted by Farley's theory.

Statement of Problem

The term "hyperkinetic" refers to the child who is persistently overactive, distractible, impulsive and excitable, regardless of the origins or causes of this behavior. Although activity level per se is essentially a quantitative dimension, in the hyperkinetic syndrome it includes the additional qualitative element of "situational inappropriateness", which inevitably brings these children into conflict with their social and academic environments. Since the highly publicized development of methylphenidate (Ritalin), it has been generally agreed that drugs which stimulate the central nervous system are the most effective treatment for the problem behaviors of hyperkinetic children. Behavioral improvements following stimulant drug treatments generally include reduced distractibility, greater attentiveness, more organized and goal-directed behavior, and less random motor activity.

Some of the research relating to the etiology of hyperkinesis deals with physiological arousal level (the general response readiness of the organism). A number of these studies have indicated that hyperkinetic children have abnormally low tonic arousal levels. For example, Wikler, Dixon and Parker (1970), Conners (1973) and Satterfield, et al. (1973) have all found EEG abnormalities in hyperkinetic children, with slow wave activity being the most common characteristic. Interpreting slow EEG activity as an indicator of decreased activation, these studies lend support to the assertion that hyperkinetic children are characterized by a low internal arousal level. This view is corroborated by studies employing other physiological measures, particularly by those investigating electrodermal correlates of hyperkinesis. Satterfield and Dawson (1971)

found significantly lower basal skin conductance, fewer and smaller non-specific GSR's, and smaller specific GSR's in their hyperkinetic sample than in their normal control group.

But the drugs used to treat hyperkinetic children have known to have a variety of side effects and possibly long-range negative effects resulting from extended use. Exclusive reliance on a medical solution is obviously inadequate; the problem also demands educational alternatives and ancillary services. However, in the educational realm viable alternatives may not yet exist to match the apparent effectiveness of treatment by stimulant drugs.

Farley (1974 a,b) has proposed a theory of arousal and stimulation-seeking which outlines specific educational alternatives for treating hyperkinesis. According to this theory, each individual has a characteristic arousal level which is trait-like in nature; furthermore, an intermediate level of arousal is optimal for effective psychological functioning, as is indicated by the fact that arousal and performance are related by an inverted U-function. Finally, arousal and stimulation-seeking are inversely related; that is, the organism modulates physiological arousal primarily by means of seeking or avoiding stimulation so as to maintain an optimal level. As Farley states, ". . . low arousal Ss will seek stimulation so as to raise their general arousal, while high arousal Ss will attempt to reduce stimulation so as to lower their general arousal (Farley, 1974a, p. 9)." It is to be expected then that hyperkinetic (low arousal) children must continually seek a high degree of stimulation from their environments so as to achieve a more optimal level of physiological arousal. If a sufficient amount of socially acceptable stimulation is not provided to compensate for this arousal deficit, it is likely that stimulation will nevertheless be sought, but perhaps in less appropriate ways.

In addition to positing hyperkinesis as a function of under-arousal, Farley sets out specific educational alternatives for its treatment:

> . . . open schools, open-space classrooms and relatively unstructured education are more arousing than traditional schools, self-contained classrooms and structured education. The former provide more and varied stimulation, ambiguity, uncertainty and unpredictability, more alternatives and therefore more choices and decisions . . . We would predict that open and more unstructured education will be particularly suited to low arousal--high stimulation-seeking students, while traditional and structured education will be particularly suited to high arousal--low stimulation-seeking students. Indeed, open education may be harmful to significant portions of school children--the high arousal ones. . .
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> (Farley, 1974 a, p. 10)

The problem addressed in this study was whether or not there is an interaction between arousal level and environmental stimulation which might be predictive of a child's adjustment to and performance in a particular kind of classroom. The hypothesis, based on Farley's adaptive education theory, was that the open classroom would provide children at the lower end of the arousal continuum with enough external stimulation to reduce their overt seeking of stimulation. Similarly, the reduced level of external stimulation found in the traditional, self-contained classroom was predicted to be better suited to high arousal children.

Subjects

The study took place throughout the 1975-76 academic year; children from six first-grade classrooms (n=98) in two central New Jersey school districts participated in the study, with a total of 50 Ss in the three op open classrooms and 48 Ss in the three traditional classrooms. Both school districts draw from populations consisting primarily of middle-class working families. Due to the importance of examining effects of classroom environment on normal children as well, a sample consisting only of hyperkinetic children was not used; therefore, all of the children for whom

permission was granted participated in the study, thus allowing arousal level to be viewed as a continuum.

Procedure

Each of the classrooms was initially observed and rated by the experimenter on a checklist derived from Walberg and Thomas' (1973) "Eight Open Education Themes"; each teacher completed an identical rating scale evaluating her own classroom environment. The sums of these two ratings were used to categorize the classrooms as "open" or "traditional", resulting in three classrooms per category.

A battery of six measures was administered to all subjects at the beginning and end of their first year of school. The battery included:

1. Physiological measures: polygraph recordings of tonic arousal (skin conductance level, or SCL, pulse rate; finger pulse volume) and phasic arousal (skin conductance response, or SCR, percent change in pulse rate and finger pulse volume in response to a specific stimulus.)
2. Observational measures: Behavior Rating Scale (Conners, 1969), a measure of hyperactivity, completed by each teacher and two independent observers.
3. Performance measures:
   A. CIRCUS II "Look-Alikes", a visual discrimination test from the E.T.S. First-grade battery, used as a measure of impulsivity and perceptual skills.
   B. CIRCUS II "Do You Know?" test of general knowledge (E.T.S.).
   C. Star Maze, a measure of concentration and motor steadiness.
   D. Pyramid Maze, a measure of stimulation-seeking.

Results

Prior to categorizing the children according to physiological or behavioral indices, results for the total population in each classroom type (open and traditional) were examined. In general, problem behaviors (as indicated by observational ratings) were less evident at the end of the year in both kinds of classrooms. However, raters and teachers agreed more with each other and more consistently over time, when making judgments about problematic behavior of children in traditional as opposed to open classrooms.

Performance measures revealed a consistency across time for the general information task in both types of classrooms, although on a measure of impulsivity (Star Maze) children in the open classrooms were taking longer and making fewer errors at both times of testing; similarly, pre- and post-test error scores on the Star Maze correlated highly in the traditional classrooms only.

Physiological data for both classroom types indicated a high correlation over time for measures of tonic arousal, but only in the traditional classrooms was there any significant correlation between pre-and post-test measures of phasic arousal.

Significant correlations obtained among the physiological variables and other indices related to hyperkinesis revealed an interesting pattern, especially evident in the open classrooms. That is, consistent relationships were found between errors on both the Star Maze and visual discrimination tasks and tonic arousal level, and between time scores on these measures and phasic arousal.

By holding arousal level constant, it was possible to analyze data specifically for subgroups of children at either extreme of the arousal

continuum. Thus, 2 x 2 x 2 analyses of variance were performed to compare effects of classroom type, arousal level, and repeated measures on each of the performance and behavior variables. Results of these analyses indicated that high arousal children, as defined by both SCL and mean pulse rate, experienced performance decrements (visual discrimination) over time in the open classrooms; in contrast, high arousal children in traditional classrooms and low arousal children in either type all showed improvement on this measure over time.

When arousal was dichotomized on the basis of either SCR latency or mean pulse rate, stimulation-seeking scores (Pyramid Maze) for Ss in the open classrooms were found to have decreased over time, while the same scores had increased for Ss in traditional classrooms.

The results of factor analyses for open and traditional classrooms also showed persistent relationships between arousal level (phasic) and classroom behavior. However, differences in the changes of the factor structures over time between the two classroom types also emerged; that is, post-test factors were more differentiated and accounted for more of the total variance in the traditional classrooms, but were more diffuse and accounted for less of the total variance in the open classrooms.

Conclusions

In general, conclusions drawn from this study were supportive of the arousal level/stimulation-seeking hypothesis. Differences in agreement among observers as to what constitutes problematic behavior became more obvious in the open than in the traditional classrooms. The results of the factor analysis for open and traditional classrooms might be seen as analogous to the lessened agreement among raters as to what constitutes appropriate behavior in open classrooms.

Systematic relationships obtained among the physiological and performance measures did point to an apparent pairing of tonic arousal with accuracy, and of phasic arousal with speed of response. The finding that children in open classrooms took longer to complete tasks, but also made fewer errors, leads one to speculate that allowing children to pursue tasks at their own pace without emphasizing group competition might be facilitative of a more reflective style.

The interaction effects revealed by the analyses of variance are of particular interest in relation to the issue of matching children with appropriate classroom environments. In these cases, it is the high arousal child who appears to be ill-suited to the environment provided by the open classroom as predicted from Farley's theory. The findings related to stimulation-seeking also lend support to the arousal/adaptive education theory tested in this investigation.

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